continuity. This conclusion is opposed to Riemann's theory. H. Weber, in his recent edition of Riemann's "Vorlesungen über die partiellen Differentialgleichungen der mathematischen Physik," has contended that a complete calculation of the energy supports Riemann's theory against Lord Rayleigh's objection, but he did not refer to Hugoniot. In the book under review no mention is made of Lord Rayleigh's objection or of H. Weber's contention, but Riemann's theory and Hugoniot's are developed side by side, and the results are compared both with each other and with the results of certain experiments by Vieille. Much of the analysis is worked out and interpreted by the aid of geometrical constructions, but the reader wishes often for a more physical interpretation.

Chapters v. and vi. contain extensions of the theories of the preceding chapters to motion in three dimensions and to waves in elastic solid media. The physical value of a theory of rapid motions, accompanied by strains that are not "small," in an elastic solid, supposed to have a strain-energy function, is extremely doubtful; but no exception can be taken to the analytical methods by which the theory is developed. Chapter vii. brings the theory of waves that do not involve discontinuities of velocity or strain into relation with the theory of characteristics of partial differential equations. The discovery of the relations between these two theories has attracted a good deal of attention recently, and we may be grateful to M. Hadamard for his masterly exposition of the subject. A few notes are appended to the volume. Of these the most interesting is the one in which it is shown that discontinuities of the first order may give rise to vortex motion, even when the pressure and density in the undisturbed state are uniform throughout the fluid.

It is a sign of the healthy state of mathematics in France that the ablest analysts are bringing their powerful methods to bear upon recondite physical questions. The book under notice is a very valuable contribution to a most important and, at the same time, a most difficult subject. It breaks fresh ground, and it cannot fail to stimulate inquiry. It may be expected to conduce to the further advance of our knowledge of aërodynamics

A. E. H. L.

THE GREAT ST. BERNARD PASS.

Across the Great St. Bernard. The Modes of Nature and the Manners of Man. By A. R. Sennett. Pp xvi+444 and 111; illustrated. (London: Bemrose and Sons, 1904.)

A FLUENT but not too accurate pen, and a general knowledge of the more frequented districts of the Alps appear to be Mr. A. R. Sennett's chief qualifications for writing this book. It has a comprehensive title, and needs it, for the St. Bernard Pass is hardly more than a thread to connect, if possible, quotations in prose and verse, scraps of science and history, descriptions of scenery, and moralisings on things in general. The author has nothing new to tell us about the St. Bernard, which is not surprising, for the pass has been often described, and a carriage road now goes the whole way from Martigny to Aosta. Mr. Sennett, however, informs us that Hannibal crossed it "with his vast army," of which he proceeds to describe the sufferings. Notwithstanding what has been written by Law, Ellis, Freshfield and others, we are well aware that it is not easy to determine what route Hannibal did follow, but thought that the Great St. Bernard was no longer advocated by anyone who had studied the question.

Other statements are disputable. We are told the soldanella flower protrudes through the edge of the *névé* (which does not mean the winter snow); that the edelweiss dwells "in snow, owning a habitat where no other flowering plant may survive," and as "its haunt is far removed from all verdant vegetation and in the most craggy and inaccessible positions," we cannot expect to see it growing at the botanical station in Bourg St. Pierre, and so forth. This village is rather more than 5300 feet above sea-level, and the plant is often found between this and 6000 feet; indeed, it can be cultivated in England. As for the craggy and inaccessible positions, we had thought newspaper correspondents now enjoyed a monopoly of this fiction. Like any other Alpine plant, it may grow in a breakneck place, but its favourite habitat is a rough slope of grass and stone. It used to grow profusely on a place of this kind, where it could be gathered in perfect safety, on a mountain ridge about a thousand feet above San Bernardino.

But Mr. Sennett, though prone to discuss scientific questions, does not always win our confidence. The "Tertiary period of the London Clay" is an odd phrase, and adamantine an inappropriate epithet for the *firn* or upper basin of a glacier; and in what respect the Lago di Garda resembles a diadem we fail to perceive. To his vision of a Europe the glacier fields of which only just failed in reaching the Alps we are perhaps accustomed, but think that most geologists at the present day would speak less confidently of glaciers having scooped out the Alpine lake basins, or having "cut out gorges for themselves through the solid mountain, divided enormous peaks in twain, planed down and levelled great asperities." The Märjelen See does not lie in a lake basin, but simply at the head of a glen, blocked by the great Aletsch Glacier, and after seeing it one day full and the next empty, we utterly disbelieve Mr. Sennett's explanation that it is emptied on the principle of a syphon. The name Mörjelen, which he prefers, may be patois, but the other form is more usual; so also is Gondo for Gonda, Guttannen for Guttenen, Meiringen for Meyrengen, and, notwithstanding Baedeker, Penninus for Pœninus (the title of the Alpine Jupiter). The science is discursive and commonplace, where not enriched by extracts from Tyndall or Ruskin, or yet more ornamental writing. Mr. Sennett may think in English, but is so prone to translate into journalese that we suspect he was trained in a certain Fleet Street haunt of young lions. We cannot welcome the verb "resurrect," the adjective "riverian" (of or belonging to a river), or "lithic" (a favourite one) when plain folks would say stony or rocky. The book, however, contains numerous illustrations, often pretty, but it is tiresome to have them (except in the appendix) only

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numbered, and to be obliged to consult a list to see what they are, especially when we are sometimes greeted with fanciful titles instead of place-names. "Dame Nature's Painters" does not much enlighten us, but it looks very like a view down the lower part of the Via Mala. But the author has tried the dangerous experiment of mingling poetry and science, and we cannot honestly congratulate him on his success.

T. G. B.

TRACHOMA.

Trachoma. By Dr. J. Boldt. Translated by J. Herbert Parsons, D.Sc., F.R.C.S., and Thomas Snowball, M.B., C.M. With an introductory chapter by E. Treacher Collins, F.R.C.S. Pp. lii+232. (London: Hodder and Stoughton, 1904.)

DR. BOLDT'S monograph on "Trachoma," published at the end of last year, deals with a subject presenting many problems to which no satisfactory solutions can at present be offered. It is therefore a matter for congratulation that an English translation of such an excellent *résumé* of the subject has been prepared. Dr. Boldt has been working for many years in one of the trachoma infested centres of Germany, and has been constantly faced during that time with these unsolved problems, and in the book before us he clears the ground of all the lumber which gathers round any subject of discussion, and states clearly the present condition of our knowledge and the lines on which future investigation must go.

The first and most important difficulty met in dealing with trachoma is that at present the ætiological factor is unknown. The discussion of this question in chapter iv. particularly, and incidentally in chapters iii. and v., will be, to ophthalmic surgeons, the most interesting part of the book. The author distinctly inclines to the view that there is a specific organism, the primary cause of trachoma, as yet undiscovered, but that also an individual predisposition and a number of subsidiary causes, such as climate, soil and race, overcrowding, uncleanliness, and other social evils, are also contributing causes.

Many workers at the present time are inclining to lay much greater stress on the importance of the individual predisposition and to hold the view that the disease may be set up by any bacterium which is pathogenic for the conjunctiva. The large number of cases in which some scrofulous taint can be traced is distinctly in favour of this view. It has been frequently shown that in such people any infection will give rise to a lymphoid hypertrophy, and the essential pathology of trachoma is primarily a hypertrophy of lymphoid follicles with subsequent degeneration of the lymphoid tissue and formation of scar tissue. Dr. Boldt, with absolute fairness, gives both hypotheses and the arguments which have been advanced by various writers in support of them.

It would be of undoubted benefit to the community if this book were to get into the hands of two classes in particular, the men who are concerned in the administration of the Poor Laws of the country, and those concerned in the medical and sanitary administration of the Army. The excellent introductory chapter by Mr. Treacher Collins gives details of the most useful work which is being carried on at Swanley, and of the influence that proper hygienic measures have had generally in checking the disease. Dr. Boldt gives similar details of the progress and subsequent checking of trachoma throughout the various countries of Europe. It would indeed be well if the last chapter were separately printed and distributed as a pamphlet to the various boards of guardians and health officers throughout the Empire.

We have nothing but praise for the way in which the translators have carried out their work. We could nowhere detect a trace of German origin in the style.

OUR BOOK SHELF.

The Cyclones of the Far East. By Rev. José Algué, S.J. Second (Revised) Edition. Pp. 283. (Manila: Bureau of Public Printing, 1904.)

IN the present edition the author has extended the area dealt with in the earlier editions, and as abundant additional data have been collected, not only from the Philippines themselves, but also from the surrounding coasts, this information has now been embodied. The author says that, "owing to the opening up of the Far East in recent years, an endeavour has been made to extend the usefulness of the work by giving a greater compass to the study of the phenomena which cause, accompany, and follow the atmospheric perturbances which are experienced in the various seas of the Far East." The title of the revised edition is changed from "Cyclones of the Philippines" to "The Cyclones of the Far East." The present edition appears in English, and is freed from the formidable list of errors found in the English version of an earlier edition. Among the many additions contained in this new edition may be mentioned some practical rules for navigating in case of encountering a typhoon, and a list and description of the ports of refuge during storms in the Far East, especially in the Philippine Archipelago.

Commendation should certainly be given of the careful arrangement and division of the whole work, which aid much the general study and grip of the valuable material, whilst numerous illustrations add much to the elucidation of the subject. Father Algué must be credited with what is only too commonly overlooked. At the conclusion of each chapter reference is given to the works which may be consulted in connection with the branch of the subject dealt with. The references appear to have been chosen with the greatest impartiality and with the sole desire to render the work as complete as possible. This example may commend itself to authors of other branches of scientific work.

The principal cause which influences the progressive movement of typhoons is said to be the general movement of the atmosphere in which they take place, not of that part only which overlies the land and sea over which they pass, but especially of that portion of the atmosphere which moves at higher altitudes, as we are to look there for the seat of the greater part of the energy and power which nourish and sustain the atmospheric whirls. This opinion is endorsed by all who discuss the nature and law of storms, but, unfortunately, too little light can be thrown on the movement of the upper air, although praiseworthy efforts are being made in this direction.

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